



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,279	09/25/2006	Ehud Dafni	GOL616.239514	6445
54042 7590 12/06/2007 WOLF, BLOCK, SHORR AND SOLIS-COHEN LLP 250 PARK AVENUE 10TH FLOOR NEW YORK, NY 10177			EXAMINER YUN, JURIE	
			ART UNIT 2882	PAPER NUMBER
			NOTIFICATION DATE 12/06/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO@WOLFBLOCK.COM

Office Action Summary

Application No.

10/599,279

Applicant(s)

DAFNI, EHUD

Examiner

Jurie Yun

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>8/17/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The preliminary amendment filed 9/25/06 has been entered.

Claim Objections

2. Claim 9 is objected to because of the following informalities: there appears to be a typo in line 2, where either "said" or "the" should precede "at least two programmable threshold discriminators." Appropriate correction is required.
3. Claim 20 is objected to because of the following informalities: in line 27, the word "Processing" should not be capitalized. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 3 and 5, the phrase "such as" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-16 and 18-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (USPN 6,408,050 B1).
8. With respect to claim 1; Han et al. disclose an apparatus (100) for improved angiographic X ray imaging of a subject's body infused with contrast agent, said apparatus comprising: an x ray source adapted to emit X rays directed to pass through the subject's body wherein said X ray beam is polychromatic; a sensor system adapted to receive attenuated X rays that passed through the subject's body, wherein said sensor comprises detection means divided into a plurality of detector elements, wherein each one of said plurality of detection elements is adapted to convert photon energy of a portion of said attenuated X rays into electric charges; at least one readout chip divided into a plurality of channels wherein each one of said plurality of channels is electronically connected to one of said plurality of detection elements and wherein each one of said plurality of channels is adapted to convert said electric charges into digital data; acquisition system adapted to receive said digital data from said sensor and generate at least two electronic representations wherein one of said at least two electronic representations is attained from low energy photons and another one of said at least two electronic representations is attained from high energy photons wherein said at least two electronic representations are measured simultaneously at the subject and at a certain position of said X ray source; processing means adapted to manipulate said at least two electronic representations into at least one image; displaying means adapted to display said at least one image; whereby said at least one image attained

from at least two energy bins amplify the appearance of the blood vessels in respect with the surrounding tissues of the subject's body (column 2, lines 1-35 & column 2, lines 59+ & column 3, lines 33-43 & 53-65 & column 4, lines 35-39 & column 5, lines 45-55). Han et al. disclose all of the elements except for use of a contrast agent.

However, use of a contrast agent is well known in the art and it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Han et al. to use a contrast agent during imaging, to enhance imaging of the blood vessels.

9. With respect to claim 20, Han et al. disclose a method for producing images of improved X ray angiography of a subject's body, said method comprising: directing polychromatic X ray beam to pass through the subject's body; positioning a sensor system adapted to receive attenuated X rays that passed through said subject's body, said sensor system comprising detection means divided into a plurality of detector elements, wherein each one of said plurality of detection elements is adapted to convert photon energy of a portion of said attenuated X rays into electric charges, and at least one readout chip provided with at least two discriminators, said at least one readout chip divided into a plurality of channels wherein each one of said plurality of channels is electronically connected to one of said plurality of detection elements and wherein each one of said plurality of channels is adapted to convert said electric charges into digital data; setting threshold levels for said at least two discriminators for each one of said plurality of channels; positioning said subject so that X ray beam passes through the body of the subject and attenuated X rays that passed through the subject's body are

received by said sensor system; acquiring single photon counting data so as to simultaneously establish at least two images from at least one of low photon energy window and at least one of high energy window; processing said at least two images so as to provide high contrast and motion artifact free image of the subject's blood vessels (column 2, lines 1-35 & column 2, lines 59+ & column 3, lines 33-43 & 53-65 & column 4, lines 35-39 & column 5, lines 45-55). Han et al. disclose all of the elements except for injecting a contrast agent into blood vessels of the subject's body. However, use of a contrast agent is well known in the art and it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Han et al. to inject a contrast agent into blood vessels of the subject's body, to enhance imaging of the blood vessels.

10. With respect to claims 2 and 3, Han et al. disclose said detection means is a pixel detector chip made of a semiconductor material, wherein said semiconductor material is selected from a group of semiconductor materials such as Cadmium Zinc Telluride (CZT) (column 2, lines 53-67).

11. With respect to claims 4-6, Han et al. disclose said detection means is a detector chip made of a scintillator material coupled to light to charge conversion elements; wherein said scintillator material is selected from a group of materials such as CsI or CsI(Tl); wherein said light to charge conversion elements comprise an array of Si photodiodes (column 2, lines 53+).

12. With respect to claims 7-9, Han et al. disclose said at least one readout chip is provided with at least two programmable threshold discriminators so as to allow each

one of said plurality of channels to output a representation of a number of photons carrying energy below a predetermined threshold, between said predetermined threshold and a higher predetermined threshold, and above said higher predetermined threshold; wherein said at least one readout chip is provided with a preamplifier and a pulse shaper; and further comprising at least two counters adapted to count events detected in said at least two programmable threshold discriminators (column 2, lines 53+ & column 3, lines 33-43).

13. With respect to claim 10, Han et al. do not specifically disclose the infused contrast agent is iodine solution. However, iodine solution is a well known contrast agent to use and it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Han et al. to use iodine solution, because this is known to work well for contrast imaging.

14. With respect to claims 11, 12, 21, and 22, Han et al. disclose said low energy photons are set below the K edge of the contrast agent and said high energy photons are set above the K edge of the contrast agent; said low energy photons are set just above the K edge of the contrast agent and said high energy photons are set further above the K edge of the contrast agent (column 5, lines 56-65).

15. With respect to claims 13 and 27, Han et al. do not specifically disclose a portion of the subject's body is the chest and wherein coronary blood vessels are imaged. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Han et al. to image coronary blood vessels, because these are typically imaged in a dual-energy imaging mode.

16. With respect to claim 14, Han et al. as modified above disclose a difference image of said low energy photons presentation and said high energy photons presentation is generated and displayed so as to amplify the appearance of the contrast agent, wherein said difference image is motion artifacts prone (column 2, lines 1-35 & column 3, lines 53-65 & column 5, lines 45-55).

17. With respect to claims 15 and 28, Han et al. do not specifically disclose a portion of the subject's body is the head and neck and wherein cranial or cranial supply blood vessels are imaged. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Han et al. to image cranial or cranial supply blood vessels, because these are typically imaged in a dual-energy imaging mode.

18. With respect to claims 16 and 29, Han et al. do not specifically disclose peripheral blood vessels are imaged. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Han et al. to image peripheral blood vessels, because these are typically imaged in a dual-energy imaging mode.

19. With respect to claims 18, 19, 25, and 26, Han et al. disclose said processing means is adapted to process said at least two electronic representations by producing a normalized high energy image of one of the electronic representation attained from high energy photons to another electronic representation attained from low energy photons and subtraction of said normalized high energy image from said another electronic representation; said processing means is adapted to process said at least two electronic

representations by producing a normalized high energy image of one of the electronic representation attained from high energy photons to another electronic representation attained from low energy photons and subtraction of a pre-determined fraction of the normalized high energy image from said another electronic representation (column 4, lines 35+).

20. With respect to claim 23, Han et al. do not specifically disclose setting threshold levels comprises irradiating said detecting means with radiation of at least two predetermined energy levels while monitoring output counting rate so as to set the threshold level slightly below the level in which the count rate drops. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that Han et al. do this, because this is necessary in setting threshold levels.

21. With respect to claim 24, Han et al. do not disclose said detecting means is irradiated with X ray photons at 32 keV for setting one threshold level and with gamma rays of 59.5 keV for setting a second threshold level. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Han et al. to do this, depending on the application being done.

22. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (USPN 6,408,050 B1) as applied to claim 1 above, and further in view of Keyes et al. (USPN 4,393,402).

23. With respect to claim 17, Han et al. do not disclose images are acquired, processed and displayed multiple times every second at a short time lag from

acquisition so as to generate real time imaging of the subject's body. Keyes et al. disclose this (column 2, lines 19+). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Han et al. to have the images acquired, processed, and displayed multiple times every second at a short time lag from acquisition so as to generate real time imaging of the subject's body, to save time.

It is noted that while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function alone. See MPEP 2114.

In this case, it should be recognized that the wherein clause is functional in nature and does not distinguish structurally the instant claim over the prior art. See MPEP 2114 and 2111.04.

Conclusion

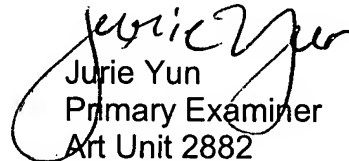
24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julie Yun whose telephone number is 571 272-2497. The examiner can normally be reached on Monday-Friday 8:30-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number:
10/599,279
Art Unit: 2882

Page 10

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Julie Yun
Primary Examiner
Art Unit 2882

November 29, 2007